PRAIRIE AGRICULTURAL DEVELOPMENT DIRECTIONS

James W. Atcheson

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2. Prairie Agricultural Development Directions
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5. Impacts and Program Delivery Aspects of Current Activities to Prevent Soil Degradation and Conserve and Improve Soil and Water Resources for Agriculture - Key Findings and Overview of Programs
6. An Overview of the Technology Transfer Systems for Soil and Water Conservation Practices in Western Canada and The United States

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EXECUTIVE SUMMARY

Soil degradation in the form of wind and water erosion, salinity, organic matter loss and acidity, is costing prairie farmers hundred of millions of dollars each year in lost production and offsetting input costs. For a variety of reasons, including their insidious nature, soil degradation problems have not received the attention they deserve in public and private decision making. There is growing concern that a deteriorating soil resource could soon become a major constraint to the growth of primary agricultural production on the prairies.

Extensive dryland cropping practices have been identified as the major cause of most prairie soil degradation problems. In general, the key to overcoming these problems lies with a combination of more intensive cropping (i.e., less summerfallow), reduced tillage, greater crop diversification and the attainment of a more balanced grain-livestock enterprise mix.

The above interrelationships suggest that an examination of prairie agricultural development directions could provide some useful insights for soil conservation policy

development purposes. More specifically, an investigation of the factors governing projected growth rates for primary agriculture provides a basis for assessing the extent to which a deteriorating soil resource might jeopardize their achievement. An examination of growth prospects for prairie grain and livestock production and the means of achieving them should also shed some light on whether or not they are likely to exacerbate or contribute to the amelioration of the various soil degradation problems. Finally, a knowledge of future farm income trends can be used to assess the ability of farmers to finance corrective measures. Our findings, based on an examination of prairie agricultural development prospects to the end of the century, are summarized below.

There is little evidence to suggest that a deteriorating soil resource will constrain the achievement of even the most optimistic long-term projections for growth in prairie grain and livestock production. Depending on the rates at which soil degradation problems grow, they will result in higher production costs. Nevertheless, such cost increases are likely to be gradual and reflected in lower farm income levels rather than lower levels of production.

Even the more pessimistic forecasts suggest moderate growth rates for prairie grain and livestock production to the end of the century. Reasonably favourable market conditions combined with certain policy changes could result in a significant expansion in both grain and livestock output. The major source of any increase in crop production will be a reduction in summerfallow acreage. Recent observations indicate a trend towards reduced tillage and greater crop diversification as well. All of these changes in crop production practices would be positive for soil conservation. An expected reversal in recent trends to a more balanced grain-livestock economy on the prairies would also be positive. In short, primary agriculture production is expected to expand and, within reason, the greater the expansion the better are the implications for soil conservation.

While the directions of future growth and change in primary agriculture are relatively clear the same cannot be said about their magnitudes. The latter are heavily dependent on evolving export markets and the success achieved in exploiting them. It follows that policy and institutional changes designed to facilitate the identification and exploitation of future export market opportunities will play an important role in the fight against prairie soil degradation problems.

Finally, as real commodity prices are predicted to continue their historical decline, farm income levels are not expected to undergo any substantial improvement in the foreseeable future. For a variety of reasons, both internal and external to agriculture, income instability is, if anything, expected to worsen. Both of these income characteristics suggest that prairie farmers will of necessity continue to be preoccupied with short-run productivity enhancing measures rather than long-run investments in soil conservation *per se*. Without a significant amount of subsidization only relatively low-cost, productivity enhancing soil conservation measures are likely to be readily adopted at the farm level.

In summary, our examination of the soil degradation implications of prairie agricultural development directions suggests that policies designed to facilitate the expansion of primary production on the prairies (particularly those related to market development and income stabilization) could be as important to soil conservation as initiatives designed to attack soil problems directly.

1. INTRODUCTION

The agri-food sector is a vital component of each of the prairie provincial economies. Prairie agriculture also makes a major contribution to the national economy. The future growth and development of this sector is therefore important to the future economic well-being of both the prairie region and Canada as a whole.1/

Although livestock production and related activities play an important role, production of grain and oilseeds for export is the driving force of prairie agriculture.2/ Despite a gradual trend towards greater intensification and diversification in prairie crop production, extensive cropping practices involving a handful of major cereals and oilseeds continues to dominate, especially in Saskatchewan. Extensive dryland cropping practices have been identified as the major cause of most soil degradation problems found on the prairies.

The declining natural productivity of prairie soils has, to date, been masked by improvements in crop

1/ For some elaboration see Appendix A.
2/ For some elaboration see Appendix B.

production technology (e.g., better tillage equipment, increased use of chemical fertilizer and herbicides and higher yielding varieties). This trade-off in many instances is, however, becoming increasingly expensive. There is a growing concern that unless a greater effort is made to arrest soil degradation it could soon become a serious constraint on prairie crop production, limiting sustainable levels of production and weakening our ability to compete in international markets.

In general, the key to overcoming the major prairie soil degradation problems lies with a combination of more intensive cropping, reduced tillage, greater crop diversification and the attainment of a more balanced grain-livestock enterprise mix. More intensive cropping means less summerfallow, the major culprit with respect to erosion and secondary (i.e., man-made) salinity. Where summerfallowing is necessary, reduced tillage would diminish its harmful effects. In some parts of the prairies forages and grain legumes could improve the economics of longer rotations and enhance soil quality as well. A larger livestock sector would provide an expanded market for forage, recycle more of the nutrients used in cereal crop production back to

the soil and reduce the incentive to place marginal land under the plough. It is also argued that a larger prairie market for feed grains would encourage more intensive cropping. The importance of a larger local market in this regard obviously depends on the transportation and marketing circumstances surrounding export grain.

Given the strong interrelationship between soil degradation and the nature of prairie agricultural development an examination of future development directions is important to any consideration of policy needs in this area. An examination of future opportunities for growth and development and the means of exploiting them should provide a basis for assessing the extent to which a deteriorating soil resource might jeopardize their attainment. It should also provide some insights as to whether future developments are likely to exacerbate or contribute to the amelioration of the various soil degradation problems. Finally, it should provide a basis for assessing the degree to which producers will have the financial incentive and ability to adopt corrective measures.

The following discussion of prairie agricultural development directions is an attempt to satisfy the above-stated needs. It begins with a descriptive analysis of recent production and income trends by sub-sector and prairie province. This is followed by an examination of medium (i.e., to end of decade) and long-term (i.e., to end of century) growth prospects for primary agriculture.1/ Soil degradation implications are outlined in each case. A final section contains a summary of future development directions and draws some policy inferences with respect to prairie soil conservation.2/

1/ Future development directions for secondary, value-added activities such as oilseed crushing and meat packing were not examined as they were deemed to be of marginal significance to prairie soil degradation concerns.

2/ While the following examination of past trends and future prospects for primary agriculture is restricted to the 3 prairie provinces, the development directions identified and their soil degradation implications would generally apply to the Peace River District of British Columbia as well.

2. RECENT TRENDS AND CURRENT SITUATION

An understanding of recent trends in prairie crop and livestock production and income levels provides a useful basis for considering future development directions in both instances.

2.1. Crops

During the past decade there has been a significant increase in the area seeded to annual crops on the prairies. The land use data presented in Table 2.1

TABLE 2.1 - PRAIRIE LAND USE CHANGES, 1974-83

Use	1974	1983	10-Year Average
	-'000 ha-		
Seeded Cropland1/	17,838	21,849	19,792
Tame Hay	2,813	2,731	2,776
Summerfallow	11,290	8,923	10,245

1/ Excludes some minor crops and cereals grown for forage.
Source: See Table C.1, Appendix C.

shows that about four million more hectares were seeded to annual crops in 1983 compared to 1974. The two principle sources of this increase have been an increase in the cultivated land base and a reduction in the cropland area that is summerfallowed each year. Prairie wide the latter

fell by some 2.4 million hectares during this period.

The reduction in summerfallow acreage has varied considerably from province to province in both absolute and relative terms. The largest absolute decrease, of about one million hectares, occurred in Alberta. This amounts to about one-third of its 1974 base. In Saskatchewan, the area summerfallowed in 1983 was roughly 900 thousand hectares less than in 1974 amounting to a 12 percent reduction. Manitoba experienced the smallest absolute reduction of only 550 thousand hectares but this amounted to a 50 percent reduction from its 1974 summerfallow base.

Saskatchewan still summerfallows about one-third of its cropland each year. For this province at least, extensive dryland cropping practices continue to persist. There appears to be considerable scope for a further reduction in the area of cropland devoted to summerfallow, particularly in Saskatchewan.

The crop mix on the prairies has not changed appreciably during the past decade.1/ Wheat remains king occupying about 60 percent of the seeded area on the prairies and close to 75 percent of the seeded area in Saskatchewan. In general, wheat and canola acreages have increased, barley, rye and flax acreages have remained more or less constant and the area seeded to oats has declined over the past decade. The area sown to other crops has been increasing, particularly in Manitoba, but is still very small.

While subject to considerable, weather related year-to-year variations, the yields of all crops have trended upward over the past decade.2/ The key factors underlying this steady improvement in yields are improved varieties and the use of better cultural practices. It is generally agreed that considerable potential for improved yields still exists.

The above noted expansion in seeded area combined with yield improvements to generate substantial increases in the production of all major crops.

1/ See Table C.1 - Appendix C.
2/ See Table C.2 - Appendix C.

except oats during the past 10 years. The five year average production in Table 2.2 shows that wheat,

TABLE 2.2 - PRODUCTION OF PRINCIPAL CROPS, PRAIRIE PROVINCES: SELECTED 5-YEAR AVERAGES, 1974-83

Crop	5-Year Average Production 1974-78	1979-83
	-thousands of tonnes-	
Wheat	18.23	20.06
Oats	3.37	2.35
Barley	9.58	10.60
Rye	.45	.64
Flax	.46	.58
Canola	1.83	2.47
Total	33.92	38.70

Source: See Table C.3 - Appendix C.

barley and canola have registered the most significant gains. Total production reached a record level of over 45 million tonnes in 1982 followed by over 41 million tonnes in 1983.

These impressive crop production gains were in response to very favourable market conditions during most of the 1970's and early 1980's. World grain trade expanded rapidly accompanied by periods of unprecedented increases in grains and oilseeds prices. Since 1981 prices for cereal grains in particular have declined (except for the feed grain price rally in 1983-84) and world trade has grown at a much slower rate. Market opportunities for prairie grain producers have, however, been excellent due to record setting increases in exports.1/

The financial implications for prairie farmers of the trends in production and markets outlined above are summarized in Table 2.3. Farm cash receipts from crops mirrored these trends rising from $3 billion in 1974 to $6.3 billion in 1983. Realized net farm income also trended upward until 1981. Since then it has suffered significant declines as costs continue to rise in the face of a levelling off in receipts.

1/ Historical grain prices, primary elevator shipments and exports for the past 10 years are provided in Tables C.5-C.7, Appendix C.

TABLE 2.3 - CASH RECEIPTS FROM CROPS AND REALIZED NET FARM INCOME, PRAIRIE PROVINCES, 1979-83

Year	Cash Receipts From Crops	Realized Net Farm Income
	-$ millions-	
1979	4,292	1,933.0
1980	4,785	1,826.2*
1981	6,400	2,212.1
1982	6,260	1,916.2
1983	6,355	1,772.4

* Low level explained by drought in Saskatchewan and Manitoba.
Source: See Tables C.4 and C.5, Appendix C.

Events of the past decade have had a profound impact on farm structure. Prairie grain farms have become more highly capitalized, cash costs have risen as a share of total costs and debt to asset ratios have also risen. Many farmers are encountering cash flow problems. Most have become increasingly vulnerable to unfavourable production or marketing circumstances not to mention conditions external to the industry such as fluctuating interest rates, rising energy costs, etcetera. These changing circumstances are bound to have an impact on future production decisions.

As a final point, it is noteworthy that despite the more recent declines in grain prices the area devoted to crop production has continued to expand. Possible explanations include: excellent market opportunities; good experience with stubble crops in recent years; enough machinery to do the job; the necessity to generate sufficient cash flow to maintain income levels and service debt in a period of declining commodity prices; and, the better relative economics of grain versus livestock production for most farmers. Whether or not such behavior is sustainable in the medium to long-run is an important question.

2.2. Livestock

Table 2.4 provides an historical summary of national and prairie livestock trends in terms of cash receipts. In 1983 livestock receipts of $9.3 billion represented about 50 percent of total farm cash receipts in Canada. Beef cattle represented 38.3 percent, hogs 18.1 percent, dairy 28 percent, poultry 13.4 percent and other livestock 2.2 percent of this total. In 1970 livestock represented $2.6

TABLE 2.4 - FARM CASH RECEIPTS FOR LIVESTOCK, PRAIRIE PROVINCES AND CANADA, SELECTED YEARS, 1960-83

	1960	1965	1970	1975	1980	1983
Canada			-percent of total livestock receipts			
Beef Cattle	33.7	37.2	37.2	38.3	43.6	38.3
Hogs	16.5	17.3	18.5	18.0	16.7	18.1
Dairy Products	30.1	26.3	25.9	27.6	24.6	28.0
Poultry Products*	16.9	16.2	16.6	14.1	12.7	13.4
Other Livestock	2.8	3	1.8	2.0	2.4	2.2
				-$'000-		
Total Livestock Receipts	1,618,583	2,126,202	2,626,304	4,889,938	8,408,076	9,288,042
Total Farm Receipts***	2,734,498	3,818,302	4,192,643	10,131,179	15,805,676	18,894,585
Percent of Total	59.2	55.7	62.6	48.3	53.2	49.2
Prairie Provinces**			-percent of total livestock receipts-			
Beef Cattle	49.8	56.3	54.9	62.8	68.9	63.1
Hogs	18.9	18.5	22.6	16.8	12.1	13.7
Dairy Products	16.2	12.0	10.1	10.1	9.7	12.3
Poultry Products*	11.7	9.6	10.4	8.3	7.2	8.5
Other Livestock	3.4	3.6	2.0	2.0	2.1	2.4
				-$'000-		
Total Livestock Receipts	528,824	705,624	887,298	1,690,109	2,977,156	3,038,839
Total Farm Receipts***	1,237,159	1,893,581	1,726,861	5,351,254	7,882,442	9,513,137
Percent of Total	42.8	37.3	51.4	31.6	37.8	31.9
Percent, Prairie Livestock Receipts Cdn. Livestock Receipts	32.7	33.2	33.8	34.6	35.4	32.7

* Poultry products include all poultry and eggs.
** Prairie Provinces include Manitoba, Saskatchewan and Alberta.
*** Total farm cash receipts are from farm operations and do not include supplementary payments.
Source: Statistics Canada.

billion, or 62.6 percent of total farm cash receipts with a similar split between the various livestock products. Over the last two decades the most obvious changes have been the decrease in livestock's share of total cash receipts from about 60 percent to 50 percent, the steady decline in poultry from 16 percent to 13 percent, and the less obvious increased importance of beef and decreased importance of dairy. The 10 percent drop in livestock's share of farm cash receipts is probably due more to the growth in cereal grains marketings than anything internal to the livestock sector as the basic realignment occurred between 1970 and 1975.

For the prairies, livestock receipts of approximately $3 billion for 1983 represent 32 percent of total farm cash receipts. Within the livestock industry the beef sector is far more prominant at 63.1 percent and the dairy sector far less prominant at 12.3 percent than at the national level. However, the same four (beef, hogs, dairy and poultry) make up a similar 98 percent of total livestock receipts.

The trends in prairie livestock receipts are similar to those at the national level, although more

pronounced. For the prairies, livestock's share of cash receipts has dropped about 10 percentage points over the past two decades but in contrast to the national trend they have dropped around 20 percentage points (versus 13 nationally) over the past decade. This differential is explained by the 10 point increase in livestock's share on the prairies (versus 3.5 nationally) between 1960 and 1970. The events of the grains sector were more influential in the prairie situation causing more resources to be shifted between sectors during the bottom and peak of the latest grain-red meat complex cycle. Poultry products have shown the same steady decline. The beef industry has been increasing in importance from 50 to 60+ percent over the 20 year period although its path has shown some internal fluctuations. Dairy has been decreasing rather steadily except for the upturn of 1983 (the identical pattern exhibited nationally). The only major contradiction between national and prairie trends is the hog sector. If anything hogs are increasing in relative importance nationally, but in the west their share of livestock receipts has dropped from 19 to 14 percent over the last two decades.

The prairie's share of national livestock receipts has remained more or less constant over the past two decades rising from 32.7 percent in 1960 to 35.4 percent in 1980 and back to 32.7 percent in 1983. In this context what the prairies has lost in hog production it has replaced with beef production growth.

Over the past two decades each prairie province has also basically held its own with respect to its share of national livestock receipts.1/ Alberta's share increased from 17 to 18.8 percent; Saskatchewan's has decreased from 9 to 7.1 percent; and Manitoba's has remained constant at roughly 7 percent. During the same period, Manitoba's share of prairie livestock receipts has remained essentially constant at 21 percent; however Alberta has gained 6 percentage points to 57 percent and Saskatchewan has dropped 6 to 22 percent. Over the last two decades Alberta has been able to provide growth within its livestock sector and Saskatchewan has not. The major causes of this shift are directly related to the relative size of their respective grain industries and the importance of wheat and barley within each.

1/ See Tables C.9 - C.11, Appendix C.

The makeup of Saskatchewan and Alberta livestock industries are identical. Beef constitutes 67-69 percent, hogs and dairy are about equal at roughly 11 percent each with poultry making up 7 percent. In Manitoba beef is only 45 percent, with hogs at 23 percent, dairy 15 percent and poultry 14 percent. Beef is obviously king in Alberta and Saskatchewan, but merely one of the big four in Manitoba.

Saskatchewan's and Alberta's livestock industries have tracked similarly since 1970, individually displaying the prairie trends mentioned above. Manitoba on the other hand has not shown as much growth in beef but has been able to maintain its hog and dairy industries to a greater extent. The Manitoba hog industry has been able to sustain its increased importance of the late 1960's where Saskatchewan has not. Surprisingly Alberta's hog industry never peaked in receipts like its sister provinces but has decreased 10 percent from 1970 to 1983 as has Saskatchewan.

Historical inventory numbers, marketings and slaughter statistics also provide some useful insights regarding prairie livestock industry trends and characteristics. The following examination of these data is restricted to red meats. As dairy and poultry are under supply control, with growth and production shifts determined with reference to population, past trends in these industries are less interesting as a guide to future development.

Livestock inventory numbers support the trends and characteristics displayed by farm cash receipts data. The data contained in Table 2.5 show that all

TABLE 2.5 - BEEF COWS ON FARMS, PRAIRIE PROVINCES, SELECTED YEARS, 1965-83

	July 1 Inventory		
Year	Manitoba	Saskatchewan	Alberta
	-thousands-		
1965	360	892	1,108
1970	344	900	1,174
1975	516	1,304	1,692
1980	410	1,045	1,515
1983	355	850	1,300

Source: Statistics Canada, Catalogue No. 21-514 and Dawson, Dau and Associates, Meat Production in Canada, 1982.

provinces experienced significant increases in their beef cow herds between 1965 and 1975 followed by declines that by 1983 left inventories slighly below 1965 levels in Manitoba and Saskatchewan and only slighly above in Alberta. Saskatchewan experienced the largest decline dropping some 450 thousand head from a high of about 1,300 thousand in 1975. Alberta dropped almost 400 thousand head from a high of close to 1,700 thousand while the Manitoba beef cow herd fell from over 500 thousand to around 350 thousand. Saskatchewan and Alberta account for over 85 percent of the prairie beef cow herd.

Perhaps more interesting are the marketings and slaughter statistics presented in Table 2.6. Each province shows an increase in marketings from 1965 to 1975 and a decrease to 1983, similar to the pattern of beef cow inventories. Saskatchewan's marketings are now 100,000 head below 1965 levels, Manitoba's are equal to 1965 levels, but Alberta's marketings are 450,000 head above 1965 levels. This is a reflection of the substantial growth in Alberta's feedlot industry over the past two decades compared to Saskatchewan and Manitoba. Manitoba is the only province where 1983 marketings are below 1980 marketings. Although

TABLE 2.6 - CATTLE AND CALVES MARKETINGS AND SLAUGHTER, PRAIRIE PROVINCES, SELECTED YEARS, 1965-83

Years	Manitoba	Saskatchewan	Alberta
Total Marketings of Slaughter Cattle and Calves			
1965	262,887	444,847	888,013
1970	270,868	395,369	993,161
1975	355,083	538,450	1,430,044
1980	270,592	287,992	1,270,303
1983	262,627	358,271	1,327,775
Total Slaughterings in Inspected Establishments			
1965	571,993	165,005	833,485
1970	447,879	156,156	914,237
1975	551,425	173,237	1,411,808
1980	311,300	186,918	1,255,362
1983	340,011	242,677	1,324,723

Source: Agriculture Canada Livestock Market Review.

Manitoba has not shown an overall decline since 1965, it has not reversed the recent trend of reduced marketings as in the other provinces.

Slaughter statistics show that Alberta's processing industry has grown with its feedlot industry as marketings and slaughterings are equivalent. In Saskatchewan slaughterings have been below marketings but the ratio has increased from 0.37 to 0.68. In short Alberta looks after its own, Saskatchewan is trying to achieve that position with Manitoba being the big loser.

Hog inventory, marketing and slaughter data for the prairies are provided in Tables 2.7 and 2.8. In the hog industry the same dramatic fluctuations brought on by events in the grain industry exist as reflected in the inventory numbers. In contrast to beef, hog inventories peaked earlier and have already reversed their dramatic declines of the early 1970's. Although inventories increased in all provinces during the late 1970's they are now decreasing again in Saskatchewan and Alberta. Manitoba has not started to decline again showing growth from 1980 to 1983 reflecting its unique ability to maintain the industry as bore out by farm cash receipts statistics.

Considering the small lags from farrowing to marketing and the respective differences in levels of industry specialization (Manitoba being more specialized than Saskatchewan), the marketing numbers bear a close resemblance to inventories.

Total hog slaughterings by province show that in contrast to the pattern of the beef industry each province processes approximately what it produces. This has been the situation for the last decade.

TABLE 2.7 - PIGS ON FARMS, PRAIRIE PROVINCES, SELECTED YEARS, 1965-83

	July 1 Inventory		
	Manitoba	Saskatchewan	Alberta
	-thousands-		
1965	421.0	454.0	1,169.0
1970	907.0	1,010.0	1,532.0
1975	582.0	492.0	873.0
1980	823.0	640.0	1,251.0
1983	898.0	520.0	1,180.0

Source: Statistics Canada. Catalogue No. 21-514.

TABLE 2.8 - HOG MARKETINGS AND SLAUGHTER, PRAIRIE PROVINCES, SELECTED YEARS, 1965-83

	Manitoba	Saskatchewan	Alberta
	Total Marketings of Hogs		
1965	580,500	576,700	1,756,400
1970	1,067,248	868,258	1,620,089
1975	873,650	615,283	1,242,259
1980	1,171,778	740,081	1,629,258
1083	1,222,855	577,065	1,595,220
	Total Slaughterings in Inspected Establishments		
1965	736,110	368,594	1,429,677
1970	1,213,226	715,225	1,515,573
1975	862,349	599,521	1,230,721
1980	1,119,928	578,380	1,738,061
1983	1,191,678	548,758	1,626,628

Source: Livestock Market Review.

Previous to that Manitoba slaughtered some of Saskatchewan's hogs (approximately 150,000 per year) whereas Alberta has looked after its own continually.

2.3. Soil Degradation Implications

As noted in the introduction, the important linkages between prairie agricultural development trends and soil degradation problems include changes in: land use patterns, crop production practices, crop mix and enterprise mix. Regarding the first linkage, some 1.5 million hectares of land have been added to the prairie crop production base during the past decade. This could exacerbate soil erosion, salinity and organic matter loss problems depending on the type of land involved and how it has been managed. As the vast majority of CLI Classes 1 and 2 land was already part of the crop production base prior to 1970, it is reasonable to assume that most of the land added since was Class 3 or worse. The limitations that characterize Classes 3 and 4 land for crop production purposes suggest that proper management practices would be particularly critical to preserving their quality.

The shift towards more intensive cropping practices that is particularly prevalent in Manitoba and Alberta is a positive trend with respect to most soil degradation problems. Yield trends suggest that farmers have adopted better stubble cropping techniques over time. Nevertheless, the adoption of complete "state of the art" packages of crop production technology that could foster the spread of more intensive cropping in all areas of the prairies has been slow. Extensive cropping practices still predominate in Saskatchewan.

Regarding crop mix, a modest trend towards greater diversification is discernible. The motivating factors would appear to be improved cash flow and lower fertilizer costs where grain legumes (i.e. pulse crops) and leguminous forages are involved rather than soil conservation per se. The dramatic increases in winter wheat production of the past 2 to 3 years suggest that this is a "new crop" worthy of attention from a variety of perspectives including soil and moisture conservation.

A number of factors, including the relatively favourable economics of grain production, have

discouraged growth in the prairie livestock industry since the mid-1970's, particularly in Saskatchewan. A worsening in the grain-livestock imbalance on the prairies has a variety of negative implications for prairie soil conservation. A larger prairie livestock industry would result in more nutrients being returned to the soil and more land being devoted to soil conserving forage production.

3. MEDIUM-TERM PROSPECTS

3.1 Crops

Regarding prospects to 1990, the Canadian Wheat Boards's 36 million tonne export target and associated 50 to 52 million tonne production requirement has undoubtedly received the most attention. To achieve this level of production will be a challenge to prairie farmers as it requires an annual growth rate during the 1980's roughly double that achieved during the 1970's. Industry experts generally agree that this level of production is physically possible by the end of the decade.1/ While economic factors may frustrate the achievement of this level of production by the end of the decade2/, it nevertheless provides a useful basis for considering medium-term crop production and land use changes of consequence to the soil resource.

A study by the Canada Grain Council examines possible sources of such a production increase.3/ It suggests that some 50 percent of the increase would come from a 2.2 million hectare reduction in

1/ See proceedings, Prairie Production Symposium, Soil and Land Resources, sponsored by Canadian Wheat Board Advisory Committee, Saskatoon, October 1980.
2/ See pp. 27-29 below.
3/ Canada Grain Council, Prospects for the Prairie Grain Industry, 1990, November 1982.

summerfallow area . A further 30 percent would result from improved yields. The remaining 20 percent would come from a 1.2 million hectare increase in new cropland. Regarding the location of the projected land use changes, Saskatchewan's summerfallow area would decrease by 1.6 million hectares (or 24 percent from 1981 levels), Alberta's by 0.4 million hectares (20 percent) and Manitoba's by 0.2 million hectares (36 percent). Alberta and Saskatchewan are expected to account for the majority of new land, contributing 540 and 495 thousand hectares, respectively. Within these provinces, new land would be concentrated in northern crop districts with one-half of Alberta's increase coming from the Peace River district.

Three additional findings from the Council's study are also noteworthy. First, the relative increases in production would be very similar among the prairie provinces, amounting to about 37 percent over 1977-81 levels in each case. Second, the crop mix is not expected to change significantly. Finally, the projected increase in prairie grain production to some 50 million tonnes by 1990 is deemed achievable without any reduction in the area currently devoted

to tame hay and pasture production.

While there appears to be no major resource constraint to achieving significant grain production increases by the end of the decade, the same cannot be said with respect to demand side factors. Production increases of the magnitude noted above are heavily dependent on maintaining a strong rate of growth in grain exports. Future export growth rates will depend on the future growth in world grain trade and Canada's share of the same. A brief look at these factors is informative.

A number of recently completed medium to long-term forecasts of global grain production, use and trade project a downturn in future growth rates. Projected annual growth rates in total grains traded range from slightly more than one percent to around five percent compared to a 5.4 percent annual growth rate for the 1960-80 period.1/ These projections imply that the opportunities to expand Canadian grain exports will not be as great in the 1980's as they were during the

1/ For more detail see C. A. Carter, International Trade Opportunities for Canadian Agriculture, paper presented to Canadian Agricultural Economics and Farm Management Society 1984 Workshop, Ottawa, July 5, 1984.

past two decades. To maintain its growth rate in grain exports Canada would have to capture an increasing share of the projected growth in world grain trade. To do so in an environment of excess supplies, fierce competition, and, in all likelihood, growing government intervention in the major importing and exporting nations, would not be easy. Some argue that, at the very least, significant changes in Canadian grain marketing and trade policies would be required.1/

Virtually all recent forecasts call for either constant or declining real grain prices.2/ This implies that, aside from brief periods of weather induced price increases, the cost-price squeeze being experienced by prairie grain producers is likely to persist. Continuing productivity gains will be essential to maintaining income levels and remaining competitive in world markets.

Income instability is also expected to increase as a host of domestic and foreign variables both within

1/ See Carter, Op. cit.
2/ For example, see S. Borland and G. Robertson, Agriculture Canada, A Sectoral View of the Longer-Term Agriculture, paper presented to the MacDonald Royal Commission, Ottawa, January 10, 1984.

and outside the grain industry exert a growing impact on the economic fortunes of prairie grain producers.

In summary, while the direction of prairie grain production to the end of the decade is no doubt upward, its magnitude is less certain. Recent projections tend to be less optimistic than those of a couple of years ago. Nevertheless the recent trend towards more intensive dryland cropping practices is expected to continue. Constant or declining real prices will constrain net income growth. Income instability is expected to increase.

3.2 Livestock

In considering what the future holds for the livestock sector it is useful to distinguish between the supply managed dairy and poultry industries and the relatively unrestricted beef and hog industries. While the Canadian red meats sector is basically a small regional segment of the North American market and therefore heavily influenced by developments in the United States, the supply managed poultry and dairy industries are at least semi-isolated from North American market forces. Assuming that they remain supply managed, future growth in dairy and

poultry will depend essentially on domestic population and demand changes. Dairy output is expected to continue its static to marginally downward growth path depending on domestic population growth, productivity changes, etcetera. Poultry production will grow in relation to domestic population increases and changes in meat consumption patterns as described below. The following discussion will focus on the more interesting red meats sector.

As already noted the Canadian red meats sector is basically a regional segment of the North American market with Canadian production at roughly 10 percent of United States production in beef and some 15 percent of United States production in hogs. Canadian prices are determined in Omaha, Nebraska adjusted to reflect relevant transportation costs and exchange differentials. Although the trade in processed meat is subject to some restrictions, the trade in live animals between Canada and the United States is virtually free.

Given the rules governing the North American livestock market complex and the relative size of

Canadian versus American production, it is prudent to assume that what is being predicted for the United States industry would hold for Canada as well. Recently, some American observers are suggesting that poultry could become the number one meat by 1990 as poultry products become increasingly competitive through continued specialization. In contrast, the beef sector will probably fare the worst of all livestock sectors for the remainder of the 1980's. Among the reasons for this is the typically small scale, non-specialized nature of the cow-calf industry, which is not amenable to the acquisition of capital needed to bring about technological change at a rate that will keep it competitive. The hog sector is expected to progress on a path somewhere between its two competitors.

On the demand side, trends suggest that per capita consumption levels for poultry and the red meats will continue to converge. Price competitiveness, health related influences, and the development of processed products attuned to changing North American lifestyles all point in the direction of higher per capita poultry consumption. In contrast, since the mid to late 1970's per capita consumption of red

meats has declined. It appears that in North America the red meat industry has become a mature market. From this highly summarized set of predictions for the North American meat industry future growth trends for the Canadian poultry and red meats sectors can be identified. While poultry will continue to gain from the demand side factors noted above the higher production costs and product prices in Canada due to supply management will preclude the achievement of per capita consumption levels envisaged for the United States. With higher poultry prices restricting substitution, red meats (especially pork) will enjoy higher consumption levels than would otherwise be the case. The Canadian beef industry will continue specializing, especially at the feedlot end, but its market share will probably decline. The price of red meats will remain bounded by transportation costs and the net import-export situation vis-a-vis the United States.

Turning to the prairies, there is reason to believe that its red meat sector could outperform that of other regions of North America in the future. It possesses few, if any, resource constraints to expanded beef and pork production. Consequently, a

relatively small decrease in production costs or increase in product prices could trigger a significant production response in this region. A general decline in grain prices back to their relativel levels of the 1950's and 1960's would obviously improve the economics of beef finishing and hog production on the prairies. This improvement would of course be enjoyed by all North American livestock producers. Possible future changes of greater consequence to the West would appear to reside in the public policy arena.

Recently, western provincial governments have shown an increasing willingness to use their treasuries to restore the balance between livestock and grain in their agricultural sectors. This emphasis is expected to continue. At the federal level, a number of policy developments that would allow the West to more fully exploit its natural advantage in livestock production can be identified. Undoubtedly the most important policy change would be to render the Western Grain Transportation Act resource neutral by paying the federal subsidy to prairie grain producers rather than to the railways. The establishment of a national red meat stabilization plan and various

changes to the domestic feed grain policy would also serve this end. A combination of such policy changes would definitely improve the West's competitive advantage in livestock production resulting in significant expansion in all facets of the industry. This, of course, assumes that markets for the additional output could be found.

As noted earlier, the domestic market for red meats possesses rather limited opportunities for growth. A significant expansion in prairie red meat production would therefore require the identification and exploitation of export market opportunities. Some interesting opportunities do exist. For example, Calgary possesses a transportation advantage over Omaha with respect to the huge beef deficit market in California. The sheer size of the Japanese red meat market makes it worth investigating further. To fully exploit these and other export market opportunities would require a major market development effort not to mention a variety of institutional changes at all levels within the Canadian livestock industry.1/ At this point it is

1/ For an elaboration see W.A. Kerr, The Livestock Industry and Canadian Economic Development, paper presented to the Canadian Agricultural Economics and Farm Management Society Workshop, Ottawa, July 5, 1984.

difficult to judge what measure of success might be achieved.

It is rather unlikely that the improved production and marketing environment for western livestock production outlined above will evolve in time to have a significant impact by the end of the decade. For the medium term it is therefore reasonable to assume that the prairie beef industry has bottomed out and will fluctuate around or, at best, expand slowly from this new plateau. Pork is expected to show signs of sustained growth and, due to its biological and structural characteristics, may just be the sleeper of the prairie livestock industry.

3.3 Soil Degradation Implications

A deteriorating soil resource has received little mention in the literature as a possible constraint to achieving a 52 million tonne prairie grain production target by 1990. In fact, the single most important means of achieving this level of production, reduced summerfallow, should help ameliorate the major soil degradation problems.

The projected increase in new cropland of over one million hectares by 1990 could contribute to soil degradation depending on the type of soil involved and how it is managed. It is noteworthy that grain production levels of over 50 million tonnes are deemed to be achievable without any reduction in tame hay or pasture area. This is a plus for soil conservation.

Although the crop mix is predicted to undergo little change, it is likely that prairie grain farmers will increasingly incorporate grain legumes and nitrogen fixing forages in longer rotations in order to reduce their chemical fertilizer costs. It is also expected that stubbled-in winter wheat will play an increasingly important role in longer crop rotations as farmers search for ways to reduce production costs, maintain incomes and remain competitive. Both of these practices bode well for future prairie soil and moisture conservation.

If the more pessimistic grain market prospects noted earlier prevail, an increase in prairie grain production to 50 or more million tonnes per annum by the end of the decade is rather unlikely. Farmers

would presumably revert to more extensive cropping practices in order to cut cash costs exacerbating most soil degradation problems in the process. Grain surpluses and lower grain prices would however encourage a more rapid expansion in livestock production with some offsetting benefits with respect to soil conservation. From a soil conservation perspective the ideal future would be one where a combination of market conditions and public policy encouraged strong growth in both the grain and livestock sectors.

The medium-term financial prospects for prairie farmers suggest that they will not be in a position to undertake large investments in soil conservation measures per se. High cost measures will be adopted only if they are heavily subsidized. Research and extension efforts in soil conservation should reflect the need for relatively low cost measures with short payback periods.

4. LONG-TERM DIRECTIONS

As is the case for the medium-term, prairie agricultural directions to the year 2000 will depend heavily on world grain market circumstances. Available forecasts of global grain production, use and trade to the end of the century indicate growth rates more or less the same as those outlined above for the medium term. Similarly, prices are expected to remain constant or decline slightly in real terms.

Long-term growth prospects for the prairie grain sector will depend largely on its export performance. Even with constant real prices, a major increase in prairie grain exports is foreseeable by the year 2000.1/ The production increase required to support what could be close to a doubling of exports from recent levels will necessitate a significant growth in cropland area, a further sizeable reduction in summerfallow area (by perhaps as much as 30 to 40 percent) and the widespread adoption of more intensive cropping practices.

Regarding long-term directions in prairie livestock, a significant reversal in the declines of the past

1/ See Borland and Robertson, Op. cit.

decade or so for red meats is foreseeable in the longer-term for reasons outlined in Section III, B above. In fact, with the right combination of institutional and domestic policy changes and a major export market development effort the red meats sector on the prairies could experience growth rates considerably higher than those in other parts of North America. The West's resource base appears perfectly capable of supporting strong expansion in both grain and livestock production.

If the long-term development directions for prairie agriculture outlined above are accurate they should make the job of reversing soil degradation trends somewhat easier in the future. Policy initiatives and institutional changes that facilitate these anticipated development directions could well be as vital to future soil conservation as policies and programs designed to attack soil problems directly.

5. SUMMARY AND CONCLUSIONS

The need to consider the future development directions of prairie agriculture as part of an examination of prairie soil problems and policy needs stem from the existence of a number of important interrelationships between the two. Among those identified in the introduction were: the degree to which a deteriorating soil resource might jeopardize the attainment of projected levels of output; the extent to which the means of attaining future output levels might exacerbate or ameliorate soil degradation problems; and, the industry's ability to undertake corrective measures. The preceding discussion was designed to shed some light on these issues. Our findings and some associated policy implications are summarized below.

Regarding the first area of concern few, if any, prognostications of increased levels of crop and livestock production suggest that a deteriorating soil resource will constrain their attainment during the period under review. Despite the existence of serious soil degradation problems the potential to expand output on the prairies is considerable. In

short, the attainment of a significant expansion in primary agriculture would appear to be much more dependent on exploiting evolving export market opportunities than on overcoming any serious resource constraint.

The preceding comments do not suggest that soil degradation problems should be ignored. They obviously have a negative impact on productivity, or alternatively, necessitate the use of offsetting inputs, the cost of which hinders the ability of prairie farmers to compete in world markets. Unfortunately, the current level of understanding of these negative effects is very limited and a greater effort to quantify them is badly needed. To ignore these problems at the present time could ultimately place the productive potential of the prairies in serious jeopardy.

The impact of future developments on soil degradation problems could be quite positive depending on the extent to which output is expanded. In general, the greater the expansion of primary production the better are the implications for soil conservation. Expanded crop production will require more intensive

land use and expanded livestock production will result in a more balanced industry. Current projections suggest moderate expansion in both areas depending heavily upon the degree of success achieved in exploiting future export market opportunities. The policies and institutional arrangements that govern performance in this area will therefore be critical to the future well-being of prairie soils.

Regarding the industry's ability to finance expensive soil conserving measures during the next two decades, the prospects are not very bright. A projected continuing decline in real commodity prices suggests that without a substantial amount of subsidization a significant increase in soil conservation measures *per se* is unlikely to take place. The high probability of a continuing cost/price squeeze means that farmers will be obliged to allocate their limited resources to short-run productivity enhancing measures rather than longer-term investments in soil conservation. In short, the future behavior of producers with respect to soil conservation is not expected to differ much from what we have observed in the past.

It is important to note that measures designed to improve short-run profits may also contribute to the amelioration of soil degradation problems. The possibilities for killing both birds with one stone would appear to be particularly good in an environment conducive to expanding output. This suggests that all policies and programs designed to foster growth and stability in prairie agriculture will have an important bearing on the fight against soil degradation. On the supply side there is a definite need for an enhanced research and extension effort surrounding economical "packages of technology" capable of serving both objectives. On the demand side it is necessary to reiterate the need to assure that policies and institutional arrangements are designed to facilitate to the greatest extent possible the exploitation of emerging market opportunities.

TABLE C.5 - REALIZED NET FARM INCOME, PRAIRIE PROVINCES AND CANADA, 1979-1983

Year	Manitoba	Saskatchewan	Alberta	Prairies	Canada
		-millions of dollars-			
1979	287.8	998.1	647.1	1933.0	3526.7
1980	274.7	947.7	603.8	1826.2	319.5
1981	254.6	1193.8	763.7	2212.1	4045.5
1982	234.9	1013.9	667.4	1916.2	3679.4
1983	288.4	876.4	607.6	1772.4	3679.4
5-Year Average	268.1	1005.8	657.9	1932.0	3621.7
		-percent-			
5-Year Average % of Prairies	13.88	52.06	34.05	100.0	
5-Year Average % of Canada	7.40	27.77	18.17	53.34	100.0

Source: Statistics Canada, Farm Net Income, Catalogue No. 21-202.

TABLE C.6 - HISTORICAL GRAIN PRICES, 1974 TO DATE

	CWB Payments, Basis in Store, Thunder Bay						Winnipeg, Cash Grain Prices			
Crop Year	CWRS #1 Wheat	#1 Feed Barley	#1 Feed Oats	Initial Total	Initial Total	Total	1CW Rye	1CW Flax	1 Can. Canola	
	-dollars per tonne-									
1973-74	82.67	64.30	68.08	119.06	68.08	111.49	116.19	403.92	279.76	
1974-75	82.67	71.19	68.08	107.05	68.08	107.32	103.29	375.67	318.95	
1975-76	82.67	73.49	68.08	104.06	68.08	105.44	105.41	274.15	226.80	
1976-77	110.23	80.38	74.57	91.50	74.57	84.15	94.85	280.42	282.13	
1977-78	110.23	80.38	74.57	88.39	74.57	74.57	103.71	225.90	295.94	
1978-79	110.23	76.00	74.00	91.08	74.00	85.41	108.32	303.75	304.77	
1979-80	128.60	80.38	68.08	107.47	68.08	68.08	178.48	329.01	309.04	
1980-81	156.16	124.01	68.08	146.55	68.08	125.39	208.03	377.59	329.35	
1981-82	174.50	124.00	110.00	132.84	110.00	110.00	168.38	352.12	325.19	
1982-83	174.50	110.00	90.00	110.00	90.00	99.53	120.64	393.83	306.39	
1983-84	170.00	95.00	75.00	N/A	N/A	N/A	N/A	N/A	N/A	
1984-85	170.00	95.00	75.00	N/A	N/A	N/A	N/A	N/A	N/A	

Source: Canada Grains Council, Canadian Grains Industry, Statistical Handbook, 1983 and Canadian Wheat Board, Grain Matters.

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APPENDIX A

THE IMPORTANCE OF PRAIRIE AGRICULTURE

One measure of the importance of prairie agriculture to both the prairie and national economies is its contribution to Gross Domestic Product (GDP). The data contained in Table A.1 shows that prairie agriculture accounts for over

TABLE A.1 - AGRICULTURE'S CONTRIBUTION TO GROSS DOMESTIC PRODUCT, PRAIRIE PROVINCES AND CANADA, 1977-1981 AVERAGES

	Man.	Sask.	Alta.	Prairies	Canada
			-$ millions-		
Agriculture	671	1,911	1,643	4,225	7,986
Goods Producing Industries	3,218	4,404	15,264	22,886	96,490
All Industries	10,501	11,514	35,780	57,995	276.237
Agriculture as a Percent of:					
			-percent-		
Goods Producing Industries	20.9	43.4	10.8	18.5	8.3
Total GDP	6.4	16.6	4.6	7.3	2.9
Prairie Agriculture GDP	15.9	45.2	38.9	100.0	-
Canadian Agriculture GDP	8.4	23.9	20.6	52.9	100.0

Source: Statistics Canada, Catalogue No. 61-202.

50 percent of Canadian agricultural GDP. It also reveals that agriculture's relative importance to the prairie economy is approximately 2.5 times its relative importance at the national level. Finally, it is noteworthy that within the prairies the relative importance of agriculture varies considerably from province to province. It is of greatest consequence by far in Saskatchewan where it accounts for some 43 percent of output from goods producing industries and over 16 percent of total provincial GDP.

APPENDIX B

THE RELATIVE IMPORTANCE OF CROPS VERSUS LIVESTOCK IN PRAIRIE AGRICULTURE

An indication of the relative importance of crops versus livestock in prairie agriculture and for Canada as a whole is provided by the farm cash receipts data for 1983 presented in Table B.1. While they are about equal at the national level, farm cash receipts from crops are more than double those from livestock on the prairies. The prairie provinces account for some 70 percent of Canadian crop receipts and roughly one-third of Canadian livestock receipts. The importance of crops versus livestock also varies considerably by province. In Alberta crop receipts slightly exceed livestock receipts while in Saskatchewan they account for over 80 percent of total farm cash receipts.

TABLE B.1 - FARM CASH RECEIPTS, PRAIRIE PROVINCES AND CANADA, 1983

Farm Cash Receipts*	Man.	Sask.	Alta.	Prairies	Canada
Crops	1,095	3,252	1,961	6,308	9,035
Livestock	644	683	1,731	3,058	9,359
Other**	32	26	25	83	495
Total	1,772	3,962	3,717	9,451	28,888
Percent of Total Cash Receipts					
Crops	61.8	81.2	52.7	66.7	47.8
Livestock	36.4	17.2	46.6	32.4	49.6
Other	1.8	.7	.7	.9	2.6
Percent of Prairie Receipts					
Crops	17.4	51.5	31.1	100	-
Livestock	21.1	22.3	56.6	100	-
Other	38.6	31.3	30.1	100	-
Percent of Canada Receipts					
Crops	12.1	36.0	21.7	69.8	100
Livestock	6.9	7.	18.5	32.7	100
Other	6.5	5.3	5.0	16.8	100

* Total may not add due to rounding.
** Includes supplementary payments.

Source: Agriculture Canada, Market Commentary, December 1983.

APPENDIX C

DATA TABLES

TABLE 3.1 - AREA OF PRINCIPAL CROPS AND SUMMERFALLOW, PRAIRIE PROVINCES AND CANADA, 1974 TO 1983

Region and Crop	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	10-Year Average
						-thousands of hectares-					
Manitoba											
All Wheat	1133.1	1254.5	1537.8	1295.0	1375.9	1214.0	1336.0	1578.0	1619.0	1862.0	1420.5
Durum Wheat	40.5	60.7	81.0	40.0	101.0	61.0	61.0	101.0	81.0	81.0	70.8
Oats1/	485.6	445.2	505.9	424.9	303.5	182.0	182.0	243.0	243.0	223.0	323.8
Barley	728.4	607.0	647.5	768.9	708.2	587.0	809.0	951.0	809.0	708.0	742.4
All Rye	41.3	47.4	37.2	44.5	50.6	50.4	60.8	76.4	88.8	85.0	58.2
Flaxseed	283.3	303.5	213.0	304.0	304.0	506.0	324.0	283.0	364.0	304.0	318.9
Canola	202.3	303.5	101.0	202.0	425.0	546.0	324.0	243.0	344.0	384.0	307.5
Mixed Grain	80.9	81.0	69.0	69.0	65.0	57.0	49.0	48.6	48.6	48.6	61.7
Other Crops2/	60.7	58.7	60.3	124.3	186.0	231.0	221.0	225.1	143.8	139.6	145.1
Tame Hay	505.9	505.9	567.0	567.0	567.0	546.0	526.0	506.0	506.0	526.0	532.3
Summerfallow	1092.6	1011.7	930.0	930.0	809.0	850.0	850.0	607.0	587.0	546.0	821.6
Saskatchewan											
All Wheat	5,870	6,151	7,042	6,556	6,920	6,879	7,163	7,831	7,932	8,377	7,072
Durum Wheat	971	1,255	1,133	607	1,174	931	1,072	1,396	1,214	1,133	1,089
Oats1/	769	749	647	627	486	405	364	445	445	344	528
Barley	1,699	1,457	1,255	1,558	1,274	1,093	1,376	1,497	1,396	1,174	1,378
All Rye	141	131	141	101	141	146	148	202	192	182	153
Flaxseed	222	182	91	242	182	323	202	146	202	121	191
Canola	587	728	344	586	1,133	1,336	890	546	607	850	761
Mixed Grain	81	71	65	40	32	36	40	26	26	28	45
Other Crops2/	84	36	36	51	68	61	74	110	103	111	73
Tame Hay	809	809	890	870	850	809	769	688	708	708	791
Summerfallow	7,246	7,366	7,280	7,203	6,879	6,920	6,920	6,678	6,597	6,394	6,948
Alberta											
All Wheat	1699.7	1821.1	2266.2	1942.5	2063.9	2105.0	2388.0	2711.0	2772.0	3115.0	2288.4
Durum Wheat	141.6	161.9	162.0	81.0	162.0	142.0	142.0	202.0	182.0	202.0	157.9
Oats1/	688.0	688.0	728.4	627.3	586.3	506.0	526.0	526.0	567.0	465.0	590.8
Barley	2,104.4	2,185.3	2,246.0	2,205.6	2,043.7	1,841.0	2,185.0	2,610.0	2,509.0	2,125.0	2,205.5
All Rye	141.6	121.4	74.5	80.9	101.2	101.1	101.1	121.2	117.3	109.2	107.0
Flaxseed	80.9	81.0	30.0	50.0	40.0	101.0	69.0	40.5	61.0	24.3	57.8
Canola	465.4	688.0	304.0	627.0	1,194.0	1,416.0	890.0	587.0	769.0	1,012.0	795.2
Mixed Grain	149.7	161.9	109.0	109.0	101.0	101.0	81.0	61.0	61.0	61.0	99.6
Other Crops2/	56.3	35.6	11.7	19.8	22.8	17.2	23.2	17.2	29.5	32.8	26.6
Tame Hay	1,355.7	1,335.5	1,538.0	1,497.0	1,460.0	1,460.0	1,497.0	1,416.0	1,416.0	1,497.0	1,447.2
Summerfallow	2,954.2	2,792.3	2,630.0	2,833.0	2,550.0	2,590.0	2,388.0	2,226.0	2,125.0	1,983.0	2,507.2

continued

TABLE C.1 - AREA OF PRINCIPAL CROPS AND SUMMERFALLOW, PRAIRIE PROVINCES AND CANADA, 1974 TO 1983 (concluded)

Region and Crop	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	10-Year Average
	-thousands of hectares-										
Prairie Provinces											
All Wheat	8,703	9,227	10,967	9,794	10,360	10,198	10,745	12,121	12,323	13,352	10,779
Durum Wheat	1,153	1,447	1,315	728	1,477	1,133	1,275	1,699	1,477	1,416	1,315
Oats1/	1,942	1,882	1,882	1,680	1,376	1,093	1,072	1,214	1,255	1,032	1,442
Barley	4,534	4,330	4,148	4,593	4,128	3,582	4,431	5,059	4,715	4,007	4,353
All Rye	321	294	220	220	293	297	338	401	399	376	316
Flaxseed	587	567	323	575	526	927	749	465	627	449	580
Canola	1,255	1,599	708	1,315	2,750	3,320	2,490	1,376	1,720	2,246	1,877
Mixed Grain	312	314	227	219	198	194	194	136	136	138	226
Other Crops2/	184	121	97	176	229	270	279	316	275	247	219
Tame Hay	2,813	2,651	2,995	2,934	2,873	2,813	2,711	2,610	2,630	2,731	2,776
Summerfallow	11,290	11,290	10,770	11,010	10,240	10,360	9,750	9,510	9,310	8,923	10,245
Canada											
All Wheat	8,934	9,479	11,251	10,118	10,580	10,489	11,073	12,427	12,555	13,651	11,056
Oats1/	2,957	2,755	2,753	2,435	2,071	1,783	1,966	1,560	1,633	1,400	2,131
Barley	4,977	4,590	4,414	4,831	4,384	3,824	4,717	5,477	5,189	4,440	4,684
All Rye	341	320	251	242	319	330	372	446	447	427	350
Flaxseed	587	567	323	575	526	927	749	465	627	449	580
Canola	1,729	1,628	720	1,347	2,824	3,440	2,570	1,401	1,777	2,327	1,976
Mixed Grain	733	743	645	624	606	594	584	545	531	511	612
Other Crops1/	185	121	97	176	229	270	279	316	275	247	220
Tame Hay	5,419	5,267	5,734	5,600	5,607	5,448	5,267	5,112	5,112	5,246	5,381
Summer-fallow3/	11,290	11,290	10,770	11,010	10,240	10,360	9,750	9,510	9,310	8,923	10,245

1/ Oats for grain.
2/ Includes peas (dry), lentils, mustard seed, and sunflower seed.
3/ Prairie provinces only.
Source: Statistics Canada, Catalogue No. 22-002, various years.

TABLE C.2 - HISTORICAL YIELDS OF PRINCIPAL CROPS, PRAIRIE PROVINCES, 1974-83

Year	All Wheat	Durum	Oats	Barley	Rye	Flax	Rapeseed/ Canola
				-kg per ha-			
1974	1,456	1,354	1,578	1,824	1,389	597	910
1975	1,770	1,717	1,887	2,112	1,608	785	1,006
1976	2,075	2,018	2,114	2,420	1,741	855	1,162
1977	1,925	1,753	2,096	2,482	1,606	1,093	1,358
1978	1,987	1,931	1,990	2,419	1,907	1,087	1,238
1979	1,593	1,588	1,902	2,236	1,549	876	1,001
1980	1,680	1,523	2,027	2,401	1,359	796	1,194
1981	1,967	1,752	2,077	2,486	2,062	1,004	1,318
1982	2,123	2,112	2,334	2,693	2,040	1,191	1,239
1983	1,964	1,903	2,107	2,496	1,927	1,092	1,261
10-Year Average	1,854	1,765	2,012	2,357	1,718	938	1,169

Source: Canada Grains Council, Statistical Handbook, 1983, and Statistics Canada, Catalogue No. 22-002.

TABLE C.3 - PRODUCTION OF PRINCIPAL CROPS, PRAIRIE PROVINCES AND CANADA, BY YEAR, 1974 TO 1983

Region and Crop	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	10-Year Average
						-thousands of tonnes-					
Manitoba											
Wheat	1605.7	2122.8	2803.2	2748.8	2830.4	2041.2	1905.1	3326.0	3701.0	3410.0	2649.4
Oats	663.1	771.1	940.8	894.5	623.3	308.4	277.6	463.0	571.0	401.0	592.3
Barley	1153.9	1110.4	1458.8	2046.6	1850.7	1262.8	1567.6	2330.0	2373.0	1589.0	1674.3
Rye	63.5	76.2	68.6	83.8	99.1	80.0	74.7	175.1	203.1	163.0	129.0
Flax	167.6	213.3	160.0	330.2	317.5	444.5	211.0	262.0	424.0	297.0	281.6
Rapeseed/Canola	192.8	283.5	102.1	290.3	578.3	567.0	294.8	306.0	420.0	408.0	344.3
Saskatchewan											
Wheat	8273.5	10,532.4	14,995.8	12,845.7	13,607.8	10,205.6	10,940.3	14,288.0	16,438.0	15,622.0	12,774.9
Oats	1156.7	1326.3	1388.0	1233.8	940.8	632.3	616.9	817.9	956.0	648.0	971.7
Barley	2917.5	2830.4	2961.0	3723.1	2917.5	1959.5	2786.9	3331.0	3636.0	2613.0	2967.6
Rye	176.0	190.5	180.3	152.4	236.2	203.2	107.9	330.0	380.7	338.0	229.5
Flax	119.4	149.9	86.4	271.8	203.2	259.1	147.0	150.0	234.0	140.0	176.1
Rapeseed/Canola	526.2	839.1	387.8	839.1	1451.5	1281.4	997.9	760.0	794.0	1089.0	895.4
Alberta											
Wheat	2776.0	3674.1	4953.2.	3238.6	4136.8	4027.9	5334.3	6221.0	6042.0	6804.0	4720.8
Oats	1233.8	1449.7	1634.7	1388.0	1172.1	1125.8	1264.6	1249.0	1357.0	1049.0	1292.4
Barley	4180.3	4964.1	5486.7	5443.1	4964.1	4550.4	6075.0	6967.0	6684.0	5291.0	5460.6
Rye	210.3	215.9	132.1	127.0	223.5	175.3	185.4	320.0	228.0	223.4	204.1
Flax	63.5	81.3	30.5	50.8	50.8	111.8	83.8	56.0	76.0	28.0	63.3
Rapeseed/Canola	424.1	691.7	335.7	805.1	1406.1	1440.2	1134.0	760.0	975.0	1111.0	908.3

continued

TABLE C.3 - PRODUCTION OF PRINCIPAL CROPS, PRAIRIE PROVINCES AND CANADA, BY YEAR, 1974 TO 1983 (concluded)

Region and Crop	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	10-Year Average
						-thousands of tonnes-					
Prairie Provinces											
Wheat	12,655.2	16329.3	22,752.2	18,833.1	20,575.0	16,274.7	18,179.7	23,835.0	26,181.0	25,836.0	20,145.1
Oats	3053.6	3547.1	3963.5	3516.3	2745.2	2066.5	2159.1	2529.9	2884.0	2098.0	2856.3
Barley	8251.7	8904.9	9906.5	11,212.8	9632.3	7772.9	10,429.5	12,628.0	12,693.0	9493.0	10,092.4
Rye	449.8	482.6	381.0	363.2	558.8	458.5	368.0	825.2	811.8	724.4	542.3
Flax	350.5	444.5	276.9	652.8	571.5	815.4	441.8	468.0	734.0	465.0	522.0
Canola	1143.2	1814.3	825.6	1934.5	3435.9	3288.6	2426.7	1814.0	2189.0	2608.0	2138.0
Canada											
Wheat	13,303.5	17,080.7	23m587.1	19,861.6	21,145.4	17,184.5	19,158.4	24,802.5	26,790.2	26,914.1	20,982.8
Oats	3977.1	4480.2	4831.3	4303.0	3620.5	2977.9	3027.6	3188.4	3683.9	2773.1	3686.3
Barley	8790.5	9509.9	10,512.9	11,798.6	10,387.3	8460.1	11,258.6	13,724.2	14,073.6	10,616.0	10,913.2
Rye	499.3	550.3	440.7	406.4	605.4	524.7	448.1	926.8	913.1	830.5	614.5
Flax	350.5	444.5	276.9	652.8	571.5	815.4	464.8	468.0	734.0	465.0	524.3
Canola	1163.5	1839.3	836.9	1973.1	3497.2	3411.1	2483.4	1836.7	2246.0	2681.0	2196.8

Source: Canadian Grains Council, Canadian Grain Industry, Statistical Handbook, 1983 and Statistics Canada, Catalogue No. 22-002.

TABLE C.4 - FARM CASH RECEIPTS FOR CROPS, PRAIRIE PROVINCES AND CANADA, 1974-1983

Year	Manitoba	Saskatchewan	Alberta	Prairies	Canada
			-millions of dollars-		
1974	486	1,619	858	2,963	4,197
1975	572	2,052	987	3,611	4,867
1976	506	1,836	917	3,259	4,693
1977	621	1,876	955	3,452	5,094
1978					
1979	754	2,333	1,225	4,313	6,242
1980	866	2,546	1,462	4,874	7,105
1981	1,004	3,283	2,106	6,393	9,100
1982	1,030	3,243	1,958	6,231	8,719
1983	1,100	3,261	2,018	6,379	9,114

Source: Statistics Canada, Catalogue No. 21-001, various years.

TABLE C.7 - PRIMARY ELEVATOR SHIPMENTS, PRAIRIE PROVINCES, FOR CROPS YEARS, 1978-79 TO 1983-84

Region and Year	Wheat	Durum	Oats	Barley	Rye	Flaxseed	Canola	Total
				-thousands of tonnes-				
Manitoba								
1978-79	1,790	77	116	1,008	47	253	321	3,612
1979-80	2,482	120	94	959	84	288	324	4,351
1980-81	2,596	160	79	1,297	124	180	147	4,583
1981-82	2,635	170	80	1,413	119	201	173	4,792
1982-83	3,107	149	70	1,220	107	244	210	5,106
1983-84	2,883	129	56	964	154	296	189	4,671
Saskatchewan								
1978-79	8,944	1,264	86	1,954	105	176	756	13,285
1979-80	10,152	1,803	155	1,781	173	150	709	14,923
1980-81	9,257	2,267	83	1,658	182	157	475	14,079
1981-82	10,086	2,081	112	2,163	197	136	580	15,355
1982-83	12,909	2,287	62	1,989	169	107	480	18,003
1983-84	11,915	2,041	94	2,254	371	183	677	17,535
Alberta								
1978-79	2,774	136	151	2,718	68	37	786	6,670
1979-80	3,767	222	315	2,993	131	52	861	8,341
1980-81	4,511	444	302	3,914	217	39	461	9,888
1981-82	4,868	384	273	3,816	192	53	541	10,127
1982-83	4,985	439	217	3,482	105	26	541	9,795
1983-84	5,697	345	237	3,669	205	46	560	10,760
Prairies*								
1978-79	13,508	1,478	353	5,676	220	479	1,863	23,577
1979-80	16,402	2,144	564	5,733	389	490	1,893	27,615
1980-81	15,902	2,721	405	5,739	449	496	1,280	26,992
1981-82	17,055	2,596	495	7,476	609	362	1,954	30,547
1982-83	21,089	2,871	368	6,815	388	382	1,228	33,142
1983-84	20,573	2,515	399	6,951	733	524	1,437	33,133

* Includes British Columbia.
Source: Canadian Grain Commission, Grain Statistics Weekly, various years.

TABLE C.8 - SUMMARY OF BULK EXPORTS OF GRAIN, CANADA, FOR CROP YEARS, 1973-74 TO 1983-84

Crop Year	Wheat	Durum	Oats	Barley	Rye	Flaxseed	Rapeseed/ Canola	Total
			-thousands of tonnes-					
1973-74	9,628	1,265	12	2,583	116	394	889	14,887
1974-75	8,803	1,423	21	2,835	123	267	593	14,065
1975-76	9,970	1,665	280	4,155	299	195	683	17,247
1976-77	11,013	1,696	491	3,609	168	356	1,018	18,351
1977-78	13,271	1,968	89	3,349	271	263	1,013	20,224
1978-79	10,949	1,350	13	3,554	154	494	1,720	18,234
1979-80	13,264	1,948	101	3,831	397	455	1,743	21,739
1980-81	13,492	2,075	45	3,236	446	519	1,372	21,185
1981-82	15,662	2,310	48	5,722	547	401	1,359	26,049
1982-83	18,269	2,687	104	5,330	251	383	1,271	28,295
1983-84*	18,679	2,543	3	5,193	734	502	1,496	29,150

Source: Canada Grains Council, Canadian Grains Industry, Statistical Handbook, 1983 and Canadian Grain Commission, Grain Statistics Weekly, September 19, 1984.

TABLE C.9 - FARM CASH RECEIPTS FOR LIVESTOCK FOR ALBERTA

Year	1960	1965	1970	1975	1980	1983
Alberta			-percent of total livestock receipts-			
Beef Cattle	51.8	55.1	59.3	66.4	72.3	67.4
Hogs	22.1	22.0	20.5	14.7	10.3	11.4
Dairy Products	13.9	11.6	10.1	9.9	9.0	12.0
Poultry Products*	9.1	7.6	8.2	7.0	6.1	7.1
Other Livestock	3.1	2.7	1.9	2.0	2.3	2.1
			-$'000-			
Total Livestock Receipts	274,307	347,655	450,494	891,071	1,657,596	1,741,841
Total Farm Receipts**	471,362	664,448	705,073	1,898,470	3,135,617	3,731,240
Percent of Total	58.2	52.3	63.9	46.9	52.9	46.7
Percent of Prairie Livestock Receipts	51.8	49.3	50.8	52.7	55.7	57.3
Percent of Canadian Livestock Receipts	17.0	16.4	17.2	18.2	19.7	18.8

* Poultry products include all poultry and eggs.
** Total farm receipts are from farm operations and do not include supplementary payments.
Source: Statistics Canada.

TABLE C.10 - FARM CASH RECEIPTS FOR LIVESTOCK FOR SASKATCHEWAN

Year	1960	1965	1970	1975	1980	1983
Saskatchewan			-percent of total livestock receipts-			
Beef Cattle	55.3	66.5	59.2	70.6	75.2	69.4
Hogs	14.6	13.3	21.6	14.3	10.4	10.9
Dairy Products	16.3	10.4	8.5	7.1	7.2	10.1
Poultry Products*	11.2	7.4	8.9	6.3	5.0	6.7
Other Livestock	2.6	2.4	1.8	1.7	2.2	2.9
			-$'000-			
Total Livestock Receipts	146,340	202,340	234,190	450,793	1 726,856	1 662,810
Total Farm Receipts**	542,684	886,884	686,057	2,510,371	3,289,336	3,993,672
Percent of Total	26.9	22.8	34.1	18.0	22.1	16.6
Percent of Prairie Livestock Receipts	27.7	28.6	26.4	26.7	24.4	21.8
Percent of Canadian Livestock Receipts	9.0	9.5	8.9	9.2	8.6	7.1

* Poultry products include all poultry and eggs.
** Total farm receipts are from farm operations and do not include supplementary payments.
Source: Statistics Canada.

TABLE C.11 - FARM CASH RECEIPTS FOR LIVESTOCK FOR MANITOBA

Year	1960	1965	1970	1975	1980	1983
Manitoba			-percent of total livestock receipts-			
Beef Cattle	37.3	45.9	40.1	43.8	51.9	44.6
Hogs	16.5	17.6	28.6	25.2	19.0	23.1
Dairy Products	22.1	14.9	11.8	14.4	12.7	15.4
Poultry Products*	18.8	16.8	17.0	14.3	12.7	13.8
Other Livestock	5.3	4.8	2.5	2.3	3.7	3.1
			-$'000-			
Total Livestock Receipts	108,193	155,935	202,614	348,245	1 592,704	1 634,188
Total Farm Receipts**	223,113	342,249	335,731	2 942,413	1,457,489	1,788,225
Percent of Total	48.5	46.6	60.4	37.0	40.7	35.5
Percent of Prairie Livestock Receipts	20.5	22.1	22.8	20.6	19.9	20.9
Percent of Canadian Livestock Receipts	6.7	7.3	7.7	7.1	7.1	6.8

* Poultry products include all poultry and eggs.
** Total farm receipts are from farm operations and do not include supplementary payments.
Source: Statistics Canada.